

Problem Set 1
Exchange Rate Economics

1. Purchasing power parity.

- 1.1 Write out the expression absolute PPP.
- 1.2 Explain why one cannot typically test for absolute PPP.
- 1.3 For what data series can one test for absolute PPP?
- 1.4 Show the steps necessary to obtain relative PPP in growth rates.
- 1.5 If relative PPP holds, is this a necessary and/or sufficient condition for absolute PPP to hold?
- 1.6 Show why mean reversion in the real exchange rate is consistent with relative PPP holding.

2. Covered and uncovered interest parity.

- 2.1 Assume that covered interest parity holds, so $(1+i) = (F/S)(1+i^*)$. Fill in the following grid (carry your answer out to three decimal places), for (a) and (b).
- 2.2 Assume that uncovered interest parity holds, so $(1+i) = (S^e/S)(1+i^*)$. Fill in the following grid (carry your answer out to three decimal places), for (c) and (d).

	i	i*	F	S
a.	0.05	0.07	2.40	
b.	0.05		2.40	2.450
	i	i*	S ^e	S
c.		0.06	2.40	2.450
d.	0.06	0.08		2.450

3. Using real data to evaluate PPP and UIP.

Consider the tables drawn from the *Economist*, April 10th, 2004 edition, on the attached pages. Answer these questions using equations. (You can use the most recent edition (March 5-11th, 2005) if you have access to a copy.

- 3.1 Using the 3 month interest rates, and assuming UIP holds, calculate the expected change in the dollar/euro exchange rate over the next three months. Be sure to state what the rate will be, in annualized terms, and what will be the actual percentage change in the dollar/euro exchange rate.
- 3.2 Given the empirical evidence on the relationship between exchange rate changes and interest differentials provided in the table in the handout on CIP and UIP, what do you expect to happen to the dollar/euro rate. Explain.

- 3.3 Using 10 year bonds, calculate what the implied change in the dollar/pound exchange rate is, over the next ten years.
- 3.4 Given the inflation rates over the past year, what should have been the rate of change in the US dollar/Canadian dollar exchange rate if relative purchasing power parity held?
- 3.5 Interpret the *Economist* poll of expected inflation rate for 2004 as the expected change from December 2003 to December 2004. What is the expected change in the US dollar/Australian dollar? (If you use the March 5-11, 2005 edition of the Economist, answer the question, using the measure of expected inflation for 2005 to answer the question).

4. [Optional] Using real world data to test for uncovered interest parity. Download the data available at: http://www.ssc.wisc.edu/~mchinn/chinn_meredith_UIPdata.xls .

- 4.1 If the software you are using can do it, plot the forward premium (assuming covered interest parity holds) and ex post depreciation.
- 4.2 Estimate the Fama regression for all the USD/DEM and USD/JPY, and the DEM/JPY, at the three months horizon.
- 4.3 What do the residuals from this regression look like?
- 4.4 Estimate the Fama regression for all the USD/DEM and USD/JPY, and the DEM/JPY, at the 10 year horizon.

	Money supply*		Interest rates % p.a. (Apr 6th 2004)						
	% change on year ago		3-mth money market		2-year	10-year gov't bonds		corporate bonds	
	narrow	broad	latest	year ago	gov't bonds	latest	year ago		
Australia	+10.6	+14.0	Feb	5.55	4.80	5.28	5.49 [§]	5.34	6.66
Britain	+ 6.8	+ 8.1	Feb	4.31	3.56	4.54	4.74 [§]	4.46	5.70
Canada	+10.3	+ 9.4	Feb	2.03	3.18	2.68	4.30 [§]	5.13	5.85
Denmark	+ 6.2	+ 6.6	Feb	2.25	2.75	2.41	4.03 [§]	4.41	5.29
Japan	+ 4.3	+ 1.7	Feb	0.03	0.02	0.12	1.44 [§]	0.68	1.60
Sweden	+ 1.0	+ 4.2	Feb	2.12	3.39	2.71	4.18 [§]	4.73	2.76
Switzerland	+24.0	+ 7.8	Feb	0.27	0.30	0.91	2.62	2.53	2.27
United States	+ 6.4	+ 4.0	Feb	1.07	1.19	1.89	3.83 [§]	3.90	5.76
Euro area [†]	+10.7	+ 6.3	Feb	2.05	2.52	2.31	3.88 [§]	4.17	3.87

*Narrow: M1 except Britain and Sweden M0, broad: M2 or M3 except Britain M4. [†]Germany for bonds. [§]Mar 31st. Benchmarks: US 30-year 5.01%, Japan No. 258 1.53%. Central bank rates: US fed funds 1.00%, ECB refinancing 2.00%, BOJ overnight call 0.001%, BOE repo 4.0%. Sources: Commerzbank, Danske Bank, J.P. Morgan Chase, Royal Bank of Canada, Stockholmsbörsen, UBS, Global Insight, Westpac, Thomson Datastream. Rates cannot be construed as banks' offers.

% change on year ago

	The Economist poll										
	Consumer prices		consumer prices forecast			Producer prices		Wages/earnings			
	latest	year ago	2004	2005	latest	year ago	latest	year ago	latest	year ago	
Australia	+ 2.4	Q4	+ 3.0	+ 2.2	+ 2.6	- 1.1	Q4	+ 1.6	+ 5.9	Q4	+ 3.9
Austria	+ 1.4	Feb	+ 1.7	+ 1.2	+ 1.3	+ 3.0	Mar	+ 2.0	+ 2.2	Feb	+ 2.2
Belgium	+ 1.1	Mar	+ 1.8	+ 1.4	+ 1.5	+ 1.4	Feb	+ 0.4	+ 1.9	Q1	+ 2.4
Britain	+ 1.3	Feb*	+ 1.6	+ 1.5	+ 1.8	+ 1.6	Feb	+ 1.5	+ 4.4	Jan	+ 3.7
Canada	+ 0.7	Feb	+ 4.6	+ 1.5	+ 2.0	- 2.5	Feb	+ 2.8	+ 4.0	Jan	+ 1.8
Denmark	+ 0.9	Feb	+ 2.9	+ 1.4	+ 2.0	- 0.1	Feb	+ 1.7	+ 3.7	Q4	+ 3.9
France	+ 1.8	Feb	+ 2.6	+ 1.8	+ 1.6	- 0.1	Feb	+ 2.2	+ 2.7	Q4	+ 3.5
Germany	+ 1.1	Mar	+ 1.2	+ 1.1	+ 1.1	+ 0.1	Feb	+ 1.6	+ 1.9	Jan	+ 2.5
Italy	+ 2.3	Mar	+ 2.7	+ 2.1	+ 2.1	nil	Feb	+ 2.8	+ 2.8	Feb	+ 2.2
Japan	nil	Feb	- 0.2	- 0.2	nil	nil	Feb	- 0.8	+ 2.0	Feb	+ 1.9
Netherlands	+ 1.2	Feb	+ 2.4	+ 1.4	+ 1.3	+ 0.6	Dec	+ 4.2	+ 2.0	Feb	+ 3.3
Spain	+ 2.1	Feb	+ 3.7	+ 2.3	+ 2.4	+ 0.7	Feb	+ 2.9	+ 3.3	Q4	+ 3.9
Sweden	- 0.3	Feb	+ 3.4	+ 0.9	+ 1.7	- 2.3	Feb	+ 0.6	+ 2.7	Dec	+ 4.0
Switzerland	- 0.1	Mar	+ 1.3	+ 0.4	+ 0.8	- 0.1	Feb	nil	+ 1.8	2002	+ 2.5
United States	+ 1.7	Feb	+ 3.0	+ 1.8	+ 1.8	+ 3.3	Jan	+ 2.5	+ 1.8	Mar	+ 3.2
Euro area	+ 1.6	Mar	+ 2.4	+ 1.7	+ 1.6	nil	Feb	+ 2.6	+ 2.5	Q4	+ 3.4

	Trade balance*, \$bn latest 12 months	Current account				Exchange rate		Currency units				Budget balance % of GDP 2004 [†]		
		\$bn latest 12 mths	The Economist poll % of GDP, forecast		trade-weighted [†] 1990=100		per \$ Apr 6th	per £ year ago	per euro	per ¥100				
			2004	2005	Apr 6th	year ago								
Australia	- 15.9	Feb	- 30.0	Q4	- 5.2	- 4.6	89.2	78.0	1.31	1.66	2.41	1.58	1.24	0.5
Austria	- 1.2	Dec	- 1.5	Jan	- 0.3	- 0.5	103.4 [§]	101.6	0.83	0.94	1.52	-	0.78	-1.2
Belgium	+ 19.3	Jan	+ 8.0	Dec	+ 4.2	+ 4.1	103.8 [§]	101.4	0.83	0.94	1.52	-	0.78	nil
Britain	+ 79.8	Jan	- 30.8	Q4	- 2.5	- 2.6	106.4	99.7	0.55	0.64	-	0.66	0.51	-2.9
Canada	+ 43.5	Jan	+ 18.5	Q4	+ 1.6	+ 1.1	88.0	80.3	1.31	1.47	2.40	1.58	1.23	0.7
Denmark	+ 9.6	Jan	+ 6.6	Jan	+ 2.7	+ 2.7	105.9	105.2	6.18	6.95	11.3	7.45	5.81	1.0
France	+ 2.5	Jan	+ 16.7	Jan	+ 1.2	+ 1.0	107.4 [§]	104.5	0.83	0.94	1.52	-	0.78	-3.7
Germany	+152.8	Jan	+ 57.1	Jan	+ 2.4	+ 2.3	105.2 [§]	101.7	0.83	0.94	1.52	-	0.78	-3.7
Italy	+ 1.2	Jan	- 21.6	Jan	- 1.0	- 1.0	76.6 [§]	74.5	0.83	0.94	1.52	-	0.78	-2.9
Japan	+110.2	Jan	+142.3	Jan	+ 3.2	+ 3.2	139.0	129.9	106	121	195	128	-	-5.8
Netherlands	+ 31.9	Jan	+ 14.4	Q4	+ 2.8	+ 3.0	103.4 [§]	100.6	0.83	0.94	1.52	-	0.78	-2.5
Spain	- 53.5	Jan	- 25.0	Dec	- 2.8	- 2.7	77.7 [§]	75.9	0.83	0.94	1.52	-	0.78	0.2
Sweden	+ 20.1	Feb	+ 18.9	Q4	+ 5.6	+ 5.3	80.1	79.6	7.64	8.55	14.0	9.21	7.19	0.5
Switzerland	+ 7.3	Feb	+ 29.4	Q3	+10.3	+10.1	110.2	115.0	1.30	1.39	2.38	1.56	1.22	na
United States	-552.7	Jan	-540.9	Q4	- 5.1	- 5.0	96.0	108.6	-	-	1.83	1.21	0.94	-5.1
Euro area	+ 87.1	Jan	+ 32.4	Jan	+ 0.5	+ 0.4	89.2	87.0	0.83	0.94	1.52	-	0.78	-2.6